

ACQUISITION OF STATE-OF-THE-ART LOGISTICS COMBAT SUPPORT SYSTEMS: THE JOINT LOGISTICS ADVANCED CONCEPT TECHNOLOGY DEMONSTRATION PROGRAM

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The past few years have seen major changes in the policies used to acquire weapon systems. Change has come from three sources. One is congressional actions (passage of Pub. L.103-355, the Federal Acquisition Streamlining Act of 1994, and subsequent language in authorization and appropriation bills for fiscal years 1995 and 1996). Another is Department of Defense (DoD) policy changes (such as DoD's Commercial and Non-Developmental Items [CANDI] and Open Architecture initiatives), and the third is publication of the "Joint Logistics Commanders' Guidance on the Use of Evolutionary Acquisition Strategy." Here we describe how these changes in acquisition philosophy have been applied to rapidly develop, field, and operate a combat logistic support system that has successfully supported joint activities within three major commands.

This article is written with the expectation that lessons learned during Phase I of the Joint Logistics Advanced Concept Technology Demonstration (JL-ACTD) can help others involved in programs to incorporate newly available technology into the equipment provided to our combat forces.

In today's global environment, our military forces are employed in joint and multinational operations. Improving their ability to operate in those modes must be a major DoD objective. The Joint Logistics Advanced Concept Technology

Demonstration (JL-ACTD), an Office of the Secretary of Defense-sponsored acquisition demonstration, was initiated to provide a logistics decision support tool for theater commanders-in-chief (CINCs) and combined joint task force (CJTF) commanders.

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At the operational and tactical level, the focus of Service logistics will shift from “supporting units and areas” to “projecting and sustaining force capability.” Specifically, logisticians will concentrate on the consolidation of management activities and eliminate the myriad of stovepipe functions (e.g., supply, maintenance, and transportation). Having appropriate communications will make it possible to see available total assets and have complete in-transit information. These attributes will consolidate into a reliable, disciplined, and responsive system that provides weapon system sustainment to combined forces.

In the “combined operations” future, logisticians will have to work through a fog of varied, unknown, and unpredictable threat scenarios. Therefore, the new logistics activity must have training modules

that simulate force equipment projection, equipment utilization rates, and force consumption rates of classes of supplies. This will permit planners to “see” the effects of their decisions on expected force and weapon system sustainability. Incorporating such modules will also enable logisticians to: (a) consider issues of ad hoc support to coalitions; (b) evaluate alternative mechanisms for tailoring capacity based logistics; (c) assess the potential for improving bare base operations; (d) analyze increased use of civilian and host nation support assets; and, (e) conduct tradeoff analyses of plans for deployment (either before, or concurrently with combat forces).

Warfighters provided the definition of an appropriate end product requirement. They modeled and analyzed logistics processes from a joint perspective, deter-

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mined opportunities to improve that process, and identified the characteristics of systems most capable of providing for those needs. This process defined the program objective: Give CINCs and CJTFs the capability to plan and execute more responsive and efficient logistics support. Phase I of the JL-ACTD satisfied this goal by providing warfighters with integrated, accurate pictures of pertinent battle space from a joint perspective in real time. Doing this required real-time integration of a tremendous amount of information presented in many different formats.

It was envisioned that the JL-ACTD would provide battlefield awareness necessary to permit all combat leadership to see the same battlefield, and to share the information required to permit joint decision making. That is, the JL-ACTD would provide the right information, at the right time, in the right place and in the proper integrated configuration for immediate use by decision makers.

But the needs of joint level Combat Service Support (CSS) planners for decision support systems vary significantly from echelon to echelon and from organization to organization. CSS planners at all echelons seek validated, integrated, high-quality automated systems to support their decision-making analyses. At the beginning of this program, direct access to relevant data was lacking, and interoperable mechanisms for summarizing and presenting data were virtually nonexistent. This lack of interactive connectivity and high-level interoperability created a myopic view of the situation, which resulted in lower quality plans and inefficient use of resources. Logisticians needed real-time information to be effective. Precise infor-

mation is needed to achieve precision logistics.

AN APPROACH TO MEETING THE CHANGING LOGISTICS REQUIREMENTS

Existing technology permits collection and distribution of tremendous amounts of information in near real time. Service components in each unified and specified combatant command have logistics inventory and accountability systems that report upwards from the tactical level to the national level through a hierarchical network. But even though such systems exist within the services and defense agencies, they are “stovepiped” within the service’s own logistics communities. As a result, these systems do not integrate those aspects of supply, maintenance, and transportation essential for making tradeoff decisions during planning and execution of contingency operations.

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The former Under Secretary of Defense for Acquisition and Technology, Dr. Paul Kaminski, initiated the JL-ACTD program to develop a modern “precision logistics unified support” system for CINC and CJTF warfighters. In it, the amount and type of logistics information needed to satisfy warfighters’ needs could be accessed, analyzed, and exchanged as needed, using a “common operating environment.”

An ACTD applies maturing advanced technologies in real-time operational scenarios to establish real-world practicability and operational utility. A successful ACTD will, upon conclusion, leave behind an in-place, resident operational capability that can be tailored, replicated, or

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transitioned into an appropriate point of the formal acquisition cycle. From the outset, the JL-ACTD was established to permit adoption of a more efficient approach to the acquisition process. As it has been pursued, the program has used the evolutionary acquisition (EA) methodology described in the Joint Logistics Commanders Guidance. The EA process has fostered rapid transition of emerging technology into a system that gives warfighters the ability to simultaneously develop appropriate doctrine and concepts of operation.

THE JL-ACTD PROGRAM

OVERVIEW

The JL-ACTD goal is to provide the warfighting CINCs and joint task force commanders with a robust capability to plan, execute, and monitor logistics operations.

The basic functional element of Phase I of the JL-ACTD is the Logistics Anchor Desk (LAD). The LAD concept was originally created by the U.S. Army Materiel Command and the Software and Intelligent Systems Technology Office of the Defense Advanced Research Projects

Agency (DARPA). The LAD (workstation) consolidates data from multiple sources, such as Automated Identification Technology, to provide situation awareness of current operations for the user. The initial "prototype" LAD leveraged existing components from the Army Research Laboratory's Knowledge-Based Logistics Planning Shell, the Transportation Command's (TRANSCOM) Analysis of Mobility Platform, and the Joint Total Asset Visibility (JTAV) program, for its initial capability to analyze current and future logistics operations. The LAD leverages the Army Research Laboratories' experience in logistics analysis and planning tools. This shared view of the battlefield is fed into models and simulations to support the development, evaluation, and analysis of courses of action. Through the use of collaborative planning and course of action analysis programs, the commander can "see" the unfolding logistical needs for strategic, operational, and tactical consideration.

The program was structured to have a two-year development phase followed by a user operational evaluation period. The prototype LAD concept was initiated by the Army Materiel Command in February 1994 as part of the Louisiana Maneuvers Program and was incorporated within the Army's Total Distribution Advanced Technology Demonstration (TDATD) in January 1995. After successful participation in Army and Joint exercises, and after briefing the Joint Logistics Commanders in January 1995, the program was established as a new ACTD on Oct. 1, 1995. (The success of the LAD led to its incorporation into the Army's TDATD in February 1995).

The LAD hardware and software configuration forms a system to function as a Logistic Decision Support Tool for CINCs and CJTF commanders. The program provided for phased installation and operation of 21 LADs at three separate CINCs over a two-year period. The CINCs annual exercises would provide a means for evaluating the LAD capabilities, defining and refining CINC operational needs, and facilitating the process for including LAD refinements in the fielded system. Figure 1

shows the elements of the LAD and how they are integrated to meet commanders' needs.

JL-ACTD CAPABILITIES EVOLUTION UNDER JOLT

The Joint Office for Logistics Technology (JOLT) was established in March 1997. The new organization is led by DARPA in close coordination with the Defense Information Systems Agency (DISA) and the Joint Staff Director of

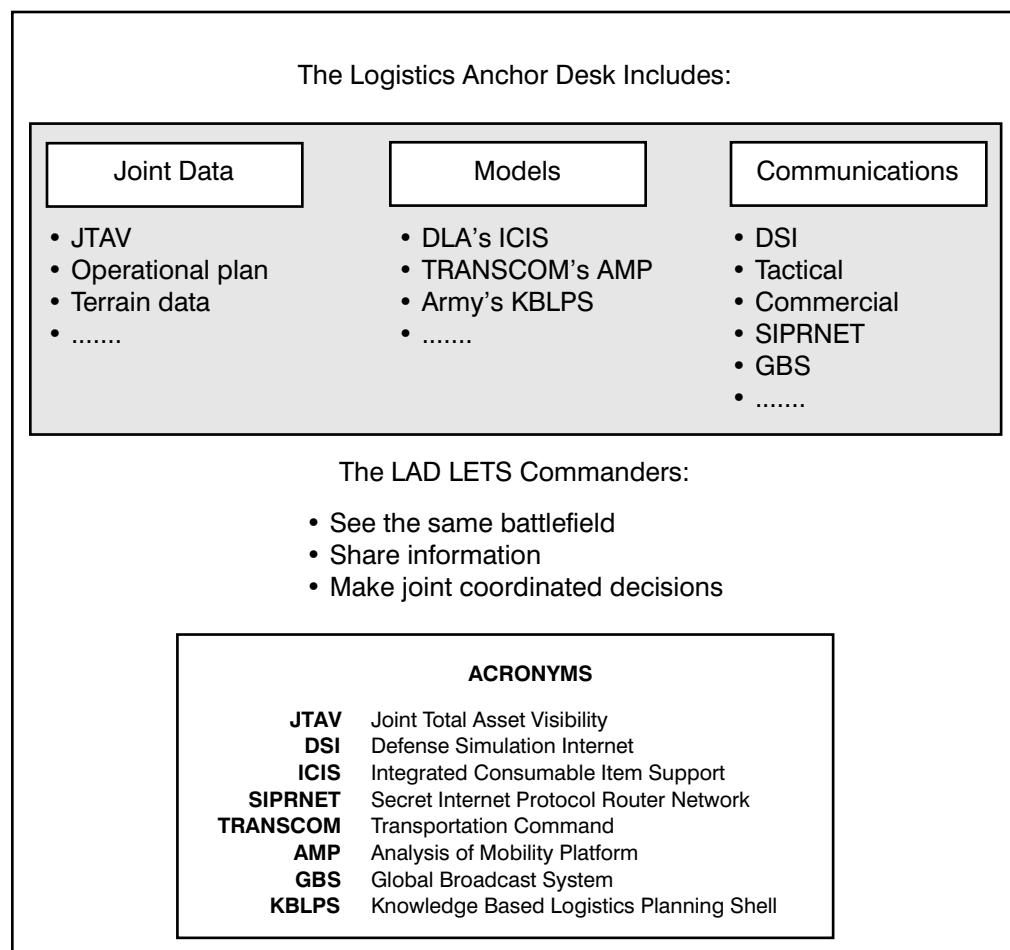


Figure 1. The JL-ACTD Logistics Anchor Desk

Logistics (J4). JOLT is responsible for the JL-ACTD. This includes transitioning Phase I (LAD) functionality to Phase II (Joint Decision Support Tools, or JDST) and to Phase III (Real-Time Focused Logistics). This action has four objectives. First is expanding the successes of the JL-

"These [support] tools will support logistics operations across the entire operational spectrum—mobilization, deployment, employment, sustainment, and redeployment."

ACTD Phase I and developing decision support tools to support all of the services, agencies, and CINCs. Second is strengthening the linkage between DARPA logistics technology initiatives and their logistics customers, and third is ensuring that JL-ACTD software tools can "plug and play" within the Global Combat Support System (GCSS) Internet environment. The fourth objective is continuing to provide "LAD functionality" to CINCs Central Command (CENTCOM), the Atlantic Command (ACOM), and the European Command (EUCOM). Phase I is currently transitioning products to the DISA GCSS.

The JL-ACTD Phase I (LAD), which was highly successful, ended in April 1997. During fiscal year 1997–98, the JL-ACTD Phase II (JDST) will develop specific joint, integrated decision support tools to provide CINC, CJTF, and service and agency planners the capability to plan or replan logistics operations based on actual asset visibility and control. These tools will support logistics operations across the entire operational spectrum—mobilization, deployment,

sustainment, and redeployment. They will conform to all Defense Information Infrastructure (DII) standards and be accessible through GCSS. They will access data through the Joint Total Asset Visibility (JTAV), Joint Personnel Asset Visibility (JPAV), Global Transportation Network (GTN), Joint Operational Planning and Execution System (JOPES), or other existing or developing architectures. People, units, equipment, and supplies will be included. These solutions will be linked with other functional area initiatives such as the Advanced Joint Planning ACTD and the Battlefield Awareness and Data Dissemination ACTD. Specific objectives are to:

- provide a single, near-real-time, globally available view of operational logistics data from strategic to tactical level;
- improve operational awareness, collaborative logistics planning, monitoring, and analysis tools;
- provide tools to enable course of action assessment, execution monitoring, and dynamic replanning within the decision cycle window;
- build on existing decision support tools where applicable, and identify and develop new tools where none exist; and
- demonstrate initial data interoperability through a shared data environment in coordination with GCSS efforts.

During fiscal year 1999–2001, JL-ACTD Phase III (Real-Time Focused Logistics) will provide a seamless information and decision support capability

among combat service support and operations functions to support the warfighter. This information will be available on any workstation (hardware independent) and on one net (the Defense Information Infrastructure [DII] common operating environment [COE]), and will present one fused picture of the expanded battle space. Specific objectives are to:

- provide operational commanders increased combat power through greater control of the logistics pipeline;
- develop and demonstrate a complete, end-to-end, advanced logistics system for the planning, executing, monitoring, and rapid replanning of a major force deployment from the continental United States (CONUS) to in-theater final destination and return to CONUS origins;
- develop and demonstrate fine-grained course of action evaluation with access to supporting information and analyses linked to all other segments of the war plan;
- demonstrate total integrated logistics infrastructure requirements for dynamic replanning; and
- demonstrate collaborative J3 and J4 interoperability via integrated operations COE workstations to support planning and execution monitoring.

PARTICIPANTS

The Operational Users are: (a) the Commander in Chief, European Command; (b) the Commander in Chief, Atlantic Command; (c) the Commander in Chief, Cen-

tral Command; (d) the warfighting CJTF elements within the Commands; (e) the Joint Staff; and (f), functional support from the U.S. Transportation Command and the Defense Logistics Agency (DLA). LADs are currently at U.S. Air Force–Europe (Ramstein AFB) and U.S. Marine Corps Bases (Camps Pendleton and Lejeune). EUCOM continues to use LAD capability in support of Operation Joint Endeavor and Joint Guard. Both ACOM and CENTCOM have LADs within their organizations.

DARPA and the service laboratories are providing technology. Twenty-one LAD units have been installed and are now operational in Europe and in the CONUS.

"The JL-ACTD focuses on improvements to situational awareness, distributed collaboration capabilities, and tools for logistics planning, monitoring, and analysis."

The LAD operating in Bosnia to support U.S. and Allied Force involvement there has been of special interest. This unit has been praised by the operational units and the CINC for the new capabilities it has provided.

RESIDUAL CAPABILITY

The JL-ACTD focuses on improvements to situational awareness, distributed collaboration capabilities, and tools for logistics planning, monitoring, and analysis. To this end, it will leave a network of workstations, interfaces to exercise and operational data, and communications within the CINCs operations and logistics planning cells. These residual capabilities will use data from the JTAV program, complement the operational planning ca-

pabilities provided by the Advanced Joint Planning ACTD, use the Battlefield Awareness and Data Dissemination ACTD telecommunications capabilities, and integrate into the emerging GCSS.

Most important, the LAD will be able to easily incorporate future technology advances that will give the CINCs the benefit of continuous system improvement to match change to their particular operational requirements. This advantage is a direct result of the way the system was designed using the evolutionary acquisition process.

THE JL-ACTD ACQUISITION STRATEGY

Streamlined acquisition and management processes have been used throughout the JL-ACTD process, resulting in the choice of an evolutionary acquisition strategy as described in the "Joint Logistics Commanders Guidance for the Use of Evolutionary Acquisition Strategy to Acquire Weapon Systems." The JL-ACTD management concepts have been tailored in accordance with DoD Instruction 5000.2-R. Phases I, II, and III of the strategy, as mentioned previously, maintain the underlying principles of an ACTD: Prototype Development and Distribution; Joint Technology Applications; and User Assessment and Evaluation.

- Phase I. LAD was essentially limited operational use of the core LAD prototype capability. The JL-ACTD LAD prototype was dynamically configured from existing models, simulations, and tech base demonstration components using advanced knowledge-based systems engineering technologies. Inter-

faces could be tailored to specific user requirements to support user-specific tasks.

- Phase II. Joint Decision Support Tools is the formal assessment and incorporation of other laboratory and service initiatives, ACTDs, etc., that will enhance or increase the LAD prototype capabilities.
- Phase III. Real-Time Focused Logistics is the major objective of a seamless information and decision support capability, to be available on any workstation and DII- and COE-compliant. Upon conclusion, the success of the ACTD will be the transition to GCSS and into the appropriate point of the formal acquisition cycle.

The phases are not mutually exclusive: succeeding phases build on the results of previous phases and use the assets provided in that phase. Demonstration exercises have been used to provide a cost-effective basis for operational users to make informed acquisition decisions when required. In addition, management of the JL-ACTD will be monitored by a Transition Integrated Product Team, including representation from the principal co-sponsoring users, development organizations, and the Joint Staff.

PRESENT STATUS AND PLANS

PAST AND CURRENT EFFORTS

The efficiency and streamlining provisions obtained by selection of an evolutionary acquisition strategy permitted rapid progress through the first phase.

Significant achievements include the following.

October 1995. The JL-ACTD began supporting EUCOM Planning Cells for Operation Joint Endeavor. Currently, The JL-ACTD maintains five LAD sites in the European Theater, including one with U.S. forces in Bosnia-Herzegovina. EUCOM support resulted in requests for two additional CONUS sites; the Army Materiel Command Logistics Operations Center and the Joint Chiefs of Staff (JCS/J4). Although the EUCOM CINC was not part of the initial ACTD, its real-world mission provided a significant test bed for LAD development and enhancement.

February 1996. The JL-ACTD Program Office tasked RAND to conduct a study to determine how distributed collaborative planning and execution in Headquarters, EUCOM and US Army Europe (USAREUR), was being supported with capabilities provided by the LAD and related Total Asset Visibility (TAV) tools and processes. The JL-ACTD Office supports these organizations in contingency planning for logistics operations in Bosnia and surrounding regions. The RAND analysis and evaluation of operational support stated that the LAD accomplished the following.

- It offered many information logistics capabilities on a single platform—movement, supply, maintenance, and engineering—and it provided efficient, deployable logistics information and automation.
- It provided useful planning and important second views for logistics planners and commanders.

- It was widely recognized as an important saver of staff time: it did real work faster, reduced staff coordination demands and busywork, and sped dissemination of authoritative information.
- It provided access to otherwise unavailable information (such as detailed, on-line National Imagery and Mapping Agency maps, and status of key assets).
- LAD video-teleconferencing contacts are confidence-builders.

September 1996. The JL-ACTD Phase I (LAD) Project Office provided its year-end report to the Office of the Secretary of Defense leadership and described its future planning for integrating its functions into the Global Command and Control System (GCCS). The Integration “In Process Review,” also held during this period, provided a clear statement of activities planned for fiscal year 1997.

FUTURE ACTIVITIES AND TRANSITION TO AN ESTABLISHED PROGRAM

The initial phase of the JL-ACTD has achieved its major objectives. It has successfully demonstrated the viability and battlefield utility of Joint Decision Support Tools, the LAD concept, and the ability of current technology

“The initial phase of the JL-ACTD has achieved its major objectives.”

to provide for expanding functional logistic support capacity. The next major priority is to incorporate this demonstrated capability with an established program office while providing for ongoing sup-

port of the residual equipment functioning in the field.

Phase I was declared a success in April 1997. As a result, the Office of the Secretary of Defense leadership decided to migrate the program to the GCSS and to have the JOLT manage the (Phase I) residual capabilities through fiscal year 1997. DISA will serve as the manager for technical aspects of the GCSS and therefore will certify the Phase I software migrating to GCSS.

A number of major considerations are involved in transfer and integration.

Interoperability. Phase II (JDST) is a joint program. Any hardware and software selected must be compliant for use within the GCSS environment.

Requirements development. During the JL-ACTD, the CINCs have assisted in the requirements refinement process. The Operational Requirements Document (ORD) will be created by the CINCs and service components and the JOLT and completed as a part of the transition to the GCSS program.

Utility assessment. An assessment of JDST military utility will be conducted by the CINCs (ACOM, CENTCOM, and EUCOM) in conjunction with support from the Operational Test and Evaluation

Command. Other assessments, as required, will be performed by other agencies. The report of acceptable military utility will be forwarded

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from the CINCs through the Transition Integration Product Team (TIPT) to the Un-

der Secretary of Defense for Acquisition and Technology. The JOLT also will receive copies of this report.

Security. Upon transition, computer vendors who are planning new computer products that feature security or security-related improvements to existing products will initiate a preliminary evaluation. Technical exchange meetings will follow execution of nondisclosure agreements between all parties. The Computer Security Center will advise vendors about potential security strengths and weaknesses of the vendor design choices.

Organization. The transition plan and details of execution will be approved by the TIPT, consisting of the responsible Office of the Secretary of Defense, CINCs, Service organizations, and agencies.

CONCLUSION

The JL-ACTD program has incorporated the concepts of evolutionary acquisition streamlining and reform throughout its execution. Specifically, the program:

- applied an evolutionary product development and acquisition strategy to ensure that final products provided to CINCs met their needs;
- used an open systems design strategy to permit widest possible use of commercially available equipment and software—100% of the hardware components and 80% of the software embedded in all of its Phase I (LAD) and Phase II (JDST) devices used CANDI;
- conducted joint testing of equipment

with the operational forces and the JL-ACTD product development teams; and

- made provisions for Phase I products to adapt to changing requirements derived during operational activities.

The CINC users provided positive feedback during this program as a result of their involvement in Phase I's use of the evolutionary acquisition methodologies. The JL-ACTD executed the strategy as follows:

- “Tools” provided through Phase I enhanced the existing capability.
- Users increased their sophistication using the demonstrated capability, gained insight, and asked for increased functionality.
- Tool capabilities were then increased to meet or exceed the new user requests, and so on.

In fact, the Phase I experience indicated that when a proper capability can be established to modify product configuration and operation, an ultimate tool may not be established because the most useful tool is always dependent upon the sophistication of the user base.

But acquiring tools (or equipment) is only the first step. Well trained and motivated people are also required to get maximum effect from their use, and the tools must be integrated within an organization flexible enough or so structured to ensure both efficient and effective use. It is the consensus of users that “value can be added” through the demonstrated Phase I capabilities. Not only has the Phase I (LAD) added to operational capability, but the DoD JL-ACTD initiative has extended the logistic effort and provided a more comprehensive overview of a critical aspect of joint and combined operations.

In search of an explanation for Phase I successes, one may hypothesize that the use of modern product design and evolutionary acquisition methodologies permitted LAD operators to assimilate and manipulate information with an assortment of efficiently crafted tools to arrive at specific operational answers.

The key to success is access to information sources and the programmers' ability to resolve problems. Data access and programming ability, tracking logistics assets, and providing “what is” and “what if” in advance, is the key to both Phase II and Phase III potential that can be demonstrated real-time. The JL-ACTD is well on its way to developing a “precision logistics unified support” (PLUS) system.

A definite PLUS for the warfighter!

